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XX — *Note on the Mouth-parts in a Species of Polyplax (Anoplura) and on the Relationship between Anoplura and Mallophaga.* By BRUCE F. CUMMINGS, British Museum (Natural History).

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ONE of the most interesting of recent memoirs on the Anoplura and Mallophaga is that published in the 'Arkiv för Zoologi' for 1910*, by Dr. Eric Mjöberg of the Academy of Sciences, in Stockholm. In the course of this work, entitled 'Studien über Mallophagen und Anopluren,' the author brings forward a very considerable amount of morphological evidence, gleaned from various regions of the anatomy, showing good cause why the Anoplura, or blood-sucking lice (usually taken to be allied to the Rhynchota), should be regarded as more closely related to the Mallophaga—or mandibulate bird-lice. An account of previous views of the systematic position of the two orders is given on page 203, and a recapitulation is here unnecessary. Mjöberg links the Mallophaga with the Psocidæ and the Psocidæ with some Blattoid-like stem-form.

For the first time, Mjöberg has presented us with a more or less extended comparison of the two groups—system for system; and, by marshalling unmistakable likenesses in the genital organs, the tracheal system, the external morphology, and even the mouth-parts, has placed the intimate phylogenetic relationship of Anoplura and Mallophaga on a sound basis. The Anoplura, therefore, appear to be Mallophaga which have taken to sucking blood, and are modified accordingly. It has been suggested that some Mallophaga, such as

* 'Arkiv för Zoologi,' vi. 1910, pp. 1-296.

Tetraphthalmus titau (Piaget), which is found firmly attached by means of its powerful tridentate mandibles to the skin of the Pelican's pouch, lives on blood; a transition from hair- and feather-feeding to gnawing at the epidermis of the skin is easily conceived, when, as soon as blood is extravasated, it becomes a comparatively short jump for the imagination to figure how a complete change in feeding-habits came about.

In regard to the mouth-parts of the Anoplura with which this note more particularly deals, it was almost to be expected that a careful search would reveal traces of their mandibulate ancestry. Enderlein, already in 1904*, likened two lateral pieces within the proboscis of *Haematopinus suis* (L.), Leach (from the Pig), to the mandibles of *Corixa*, a Heteropterous bug. Enderlein regards the Anoplura as a suborder of the Rhynchota. But the pieces in the proboscis of *Arctophthirus tricheci*, Boh., described and figured by Mjöberg in the paper already named bear a direct resemblance to the mandibles of Mallophaga rather than to those of *Corixa*, which are remarkable in form and have a peculiar basal piece. Moreover, in a species of *Polyplax* from an Egyptian host—*Acomys cahirinus*, Des.,—about to be described under the name *P. oxyrhynchus*, there are two chitinous structures lying together behind the pharynx (*larynx* of Enderlein), which are quite probably mandibles, and closely resemble those figured by Mjöberg, *i. e.* each lies with its narrow end pointing inwards and a tendon-like strip of chitin runs back from the base of the posterior lateral angle. The mouth-parts of the louse form, of course, an almost classical problem in morphology, and many authors, from Swammerdam to Schölte and after, have tackled it with varying success. The inherent difficulties in dissecting the proboscis probably constitute the reason why we still lack any very settled views on its structure and morphology, and the suggestions put forward here are therefore to be regarded as the advertisement of problems to be solved rather than as definite solutions.

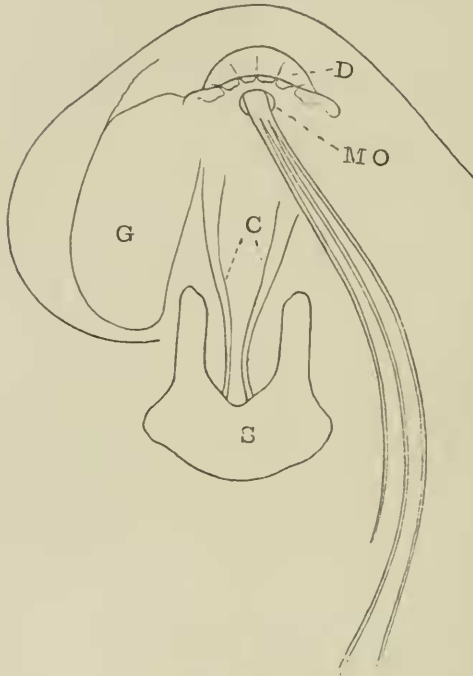
In another species—to be called *Polyplax brachyrhynchus*—from the same host, a still more interesting structure was found on the under surface of the head in front of the pharynx and just behind the mouth-opening.

A glance at fig. 1 (p. 258) is sufficient to suggest at once to a student of the Mallophaga the well-known oesophageal sclerite and "glands" which form a prominent feature in the

* Zool. Anz., Bd. xxviii. 1904. pp. 121-147.

literature of this group*. This sclerite (sometimes called "lyriform organ" and homologized with the hypopharynx) and glands (better known as basal pieces), almost unique in

Fig. 1.



Infra-buccal plate of *Polyplax brachyrhynchus* (Anoplura). The whole of the top of the head has been dissected away, so that the plate is seen from above. The bundle of elongated needle-like trophi, which are sketched in only diagrammatically, have been drawn on one side to leave the plate clear.

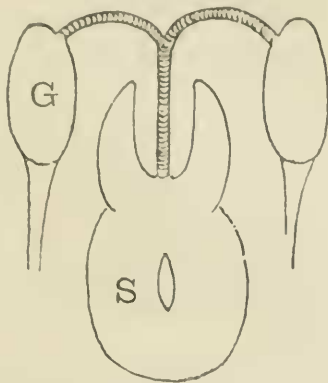
MO = Mouth-opening; D = Rostral denticles; S = Infra-buccal plate (or sclerite); C = Chitinous chords; G = ? "Gland" (this was only visible on one side). Greatest length of the plate = $\cdot 013$ of a millimetre; greatest width = $\cdot 016$.

the comparative anatomy of the insect-mouth, occur in their typical form in the suborder Ischnocera of the Mallophaga

* *Vide* V. L. Kellogg, Proc. Calif. Acad. Sci. vol. vi. 1896. R. Snodgrass, Trans. Am. Ent. Soc. xxxi. Nr. 4, 1905, pp. 297-307; P. Z. S. 1913, p. 128. Armenaute, Boll. della Soc. di Naturalisti in Napoli, xxiv. (ser. 2, vol. iv.) 1910, p. 76.

(see fig. 2). A curious "duct" (or chitinous chord), cross-barred like a trachea, runs forward from between the anterior cornua of the sclerite and bifurcates in front, each branch running into a basal piece or "gland," which is, according to Armenaute, only a hard flat oval piece of chitin, without glandular structure.

Fig. 2.



Diagrammatic sketch of the oesophageal sclerite (or lyriform organ) and "glands" (or basal pieces) in Mallophaga.

G=Gland ; S=Sclerite.

The infra-buccal plate in *P. brachyrhynchus* is apparently fused at least in part with the lower wall of the head. It is extremely minute and correspondingly difficult to dissect, as the whole head itself in this species measures only .20 of a millimetre in length. The vestigial character of this plate and the two chitinous chords, which arise from between the two anterior horns by separate roots, is indicated by the delicacy and, in different specimens, by the varying outline of the parts. Both plate and chords are present in all specimens, however, and the former stains deeply with acid fuchsin. On one side in the specimen from which the drawing is made indications of a "gland" or basal piece were observed, and its outline is therefore given.

An infra-buccal plate is present in other species of *Polyplax*, including *P. spinulosa*.